DOCUMENT RESUME

ED 406 906 HE 030 080

AUTHOR Heller, Donald E.
TITLE Tuition, Financial Aid, and Access to Public Higher Education: A Review of the Literature.
PUB DATE Feb 96
NOTE 58p.
PUB TYPE Information Analyses (070)
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Access to Education; *College Attendance; College Students; Community Colleges; Economic Research; *Enrollment Influences; Higher Education; *Public Colleges; Racial Differences; Socioeconomic Background; *Student Financial Aid; *Tuition

ABSTRACT

This paper reviews the literature on the relationship between rising tuition and access to public higher education in the United States. It reviews research on the relationship between tuition and enrollment in higher education, noting that every study considered has found an inverse relationship between tuition and enrollment rates. The evidence suggests that a tuition rise of $100 is consistent with a 0.5 to 1.0 percentage drop in enrollment. The paper also considers the relationship between financial aid and enrollment, noting that the findings in this area are more complex than in the area of tuition, with some studies finding some students less sensitive than others to increases or decreases in financial aid. It then examines the effects of tuition and financial aid on students of different incomes, races, and college sectors. These studies have indicated that lower-income, black, and community college students are more sensitive to changes in tuition and financial aid than their counterparts. Appendixes provide information on tuition and fees at public colleges and universities; summaries of the relationship between tuition, financial aid, and enrollment; and a summary of income, race, and sector effects. (Contains 53 references.) (MDM)

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# Tuition, Financial Aid, and Access to Public Higher Education: A Review of the Literature

Donald E. Heller
Harvard Graduate School of Education
February, 1996

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# Tuition, Financial Aid, and Access To Public Higher Education: A Review of the Literature

Qualifying Paper

Submitted by

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February, 1996

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## 1. Introduction

Policy makers have long been concerned with the cost of higher education, and whether that cost provides an obstacle for entry by certain students. As far back as 50 years ago, President Truman's Commission on Higher Education sounded an alarm concerning equality of access to the nation's colleges and universities:

> By allowing the opportunity for higher education to depend so largely on the individual's economic status, we are not only denying to millions of young people the chance in life to which they are entitled; we are also depriving the nation of a vast amount of potential leadership and potential social competence which it sorely needs. (quoted in Mumper, 1996, p. xv)

This view was not held only by those in the public sector. Harvard president James Bryant Conant wrote in 1942 about the role of colleges in helping to prepare America's youth to fight in World War II:

> Anyone who is familiar with the operation of our American educational system realizes that all too often accidents of geography and of parental fortune determine who goes to college and who does not. Every survey of our educational systems has emphasized this fact. (p. 50)

While the federal government did not become a major player in helping to ensure equal opportunity for postsecondary education until the 1960s, states have long played a role through direct subsidy of public colleges and universities. These subsidies historically have kept public tuition rates relatively low for all students. The impact of state policy on enrollment in public higher education is critical. Clotfelter (1991) notes that

> It would be impossible to gain a fair impression of U.S. public policy to encourage college attendance without considering the role of the states. State policies directly affect the demand for undergraduate places in two ways — through their institutional support of public institutions and through state student aid programs. (p. 113)

The level of institutional support of public institutions helps to determine the tuition paid by students; the higher the support provided by the state, the lower the tuition generally paid by students.

The 1980s and 1990s have seen unprecedented increases in tuition rates at public and private universities. While the early to mid-1980s saw large increases primarily at private universities, fiscal pressures on states during the late 1980s and into the 1990s forced tuition increases at public institutions that far exceeded inflation. Examples of increases in public college tuition are shown in Appendix A. In every category of institution, real tuition rates *after* inflation increased at least 5% per year from 1989 to 1993. These increases occurred at a time when family incomes decreased in real terms.

A major concern with these recent tuition increases is whether access to public higher education has been affected, especially for students who historically have enrolled in public colleges. While microeconomic theory demonstrates a downward-sloping demand curve for higher education (as tuition increases, enrollments would decrease, *ceteris paribus*), the impact of tuition changes may vary depending upon changes in other factors. These other factors may include the size of the college-high school earnings gap (also known as the college wage premium), students' ability to pay for college, and the availability and desirability of alternatives to college, such as entering the workforce or the military.[1] The demand for higher education may also be affected by differences in students' "tastes," or preferences, which may include their willingness to pay for college.

Even though we would expect a certain reaction to tuition increases in the aggregate, students with varying characteristics may react differently. For example, students from poorer families may be more sensitive to tuition increases than students from wealthier families. Similarly, students from minority families may be more sensitive to tuition increases than students from white families. The greater sensitivity of minority students could be because of income differences, or may reflect some other difference between white and minority students.

In this paper, I address the relationship between tuition and access to public higher education in the U.S. by reviewing quantitative studies of the topic. This subject is important for a number of reasons. If higher tuition does restrict access to public institutions by those most dependent upon them, minority and lower-income students may have no other options for obtaining

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[1] To understand the importance of these other factors, one need only examine the history of higher education enrollments in the 1980s. Tuition levels during the decade were increasing at the fastest rate in history at the same time that the number of high school graduates was shrinking by 17% as the last of the baby boomers graduated from high school. Yet college enrollments continued to grow due primarily to an increase in participation rates, especially among women and older students. This result was the opposite of that predicted by many researchers and policy makers. See for example McPherson (1978), and many of the other essays in that volume.

a college degree. As over 80% of undergraduates today attend public institutions, maintaining access to these schools is critical. Decreasing enrollment rates of minority students (relative to whites) may be one indicator that these students are having trouble affording college.

In addition, a baccalaureate education is critical to earning a livable wage today. A recent Census Bureau publication (Kominski and Sutterlin, 1992) shows that the average earnings of workers over 18 with a bachelor's degree are almost twice those possessing only a high school diploma. The difference is even greater for blacks. Restricting access to higher education may serve to exacerbate the earnings gap between blacks and whites.

Financial aid programs administered by federal and state governments were created originally to equalize educational opportunity for underrepresented groups.[2] Financial aid acts as a price discount, lowering the net cost paid by recipients. When addressing the relationship between tuition and access to higher education, then, it is critical also to examine the impact of financial aid on that relationship.

The specific research questions I address in this paper are:

1. What effect do tuition increases have on undergraduate enrollments in public higher education?
2. Does the existence and/or magnitude of financial aid awards affect enrollment?
3. Do these tuition and financial aid effects differ for:
   a) Students of different races?
   b) Students of different incomes?
   c) Enrollment in community colleges versus 4-year institutions?

The intent of this paper is not to review every study that touches on these questions; rather, it is to address those quantitative analyses that have contributed most to the literature by using different methodologies, and through the publication of divergent results.

The research reviewed here does not focus only on public higher education. Many studies do not examine public and private institutions separately. I have endeavored to include those

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[2] While the majority of aid awarded by the federal government and state grant programs is need-based, institutional aid is awarded based on both need and merit. The percentage of merit aid awarded by institutions has been on the rise in recent years, with the greatest increases at public institutions (McPherson and Schapiro, 1994b). While total institutional aid is still less than 20% of all aid awarded, its share has been growing in recent years (The College Board, 1993).

studies that do distinguish between the two, especially when the answers to these questions differ for public and private institutions.

## 2. The Relationship Between Tuition and Enrollment in Higher Education

As described earlier, economists believe that higher tuition rates should result in lower levels of enrollment, all other things being equal. But rarely in the real world are all other things equal. This topic does not lend itself to experimental or even quasi-experimental study, so researchers must analyze the behavior of students as they react to different options in the real world. Because public college tuition rates are set by each state, either through its higher education governing board or by each institution itself, the action of states in determining public college enrollments is of interest to researchers. Thus, the variance in public tuition rates among states provides a natural experiment for researchers to analyze.

Researchers have long studied the effect of tuition on enrollment in higher education. These studies have sought not just to confirm the existence of a downward-sloping demand curve for higher education, but to provide more information regarding the nature of that curve. Is the relationship between tuition and enrollment linear or curvilinear? How sensitive is enrollment to tuition at different price levels? Do students with different characteristics have different demand curves?

When examining the relationship between tuition and enrollment in higher education, it is problematic to exclude the existence of financial aid into the equation. As described earlier, financial aid acts as a price discount, serving to lower the net cost paid by the student. Nevertheless, there is some evidence to indicate that students react differently to the posted tuition level, often referred to as the "sticker price," than they do to the actual price they pay after taking financial aid into account.[3] Thus, I will look first at the question of how tuition levels themselves relate to enrollment rates. Chapter 3 will examine the relationship between financial aid and enrollment.

There are numerous methods researchers use to estimate the relationship between tuition and access to higher education. One method is perhaps the simplest: ask students how sensitive they are to increases in tuition rates. The American Freshman Survey has been conducted annually since 1966 by Alexander Astin and associates at the UCLA Higher Education Research Institute. They survey a representative sample of full-time college freshmen from across the country. Among

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[3] Most researchers exclude the cost of room and board in the calculation of the sticker price, as they assume that these subsistence costs would be borne by the student even if he chose options other than attending college.

other questions, they ask the respondents for the reason(s) they selected the college they attended. While such factors as academic reputation and job placement record of the college have historically been important, the affordability of the college has grown in importance over the last decade. From 1983 to 1994, the percentage of freshman citing low tuition as "very important" in their decision grew from 22% to 29% (Mortenson, 1995). This increase was consistent across students with different characteristics and attending different types of institutions. The significance of this increase can be understood when the other decision factors are examined. During this period, no other factor (excluding financial aid) grew in importance by more than three percentage points.

The UCLA results were echoed in a report recently issued by The Education Resources Institute and The Institute for Higher Education Policy (1995). The report presented the results of a survey of students and their families who borrow to pay for college. Almost 90% of the respondents answered "Yes" to the question, "In my opinion, the cost of college is rising at a rate that will soon put college out of reach for most people" (p. 31).

The American Association of State Colleges and Universities (AASCU) surveys its members annually regarding tuition charges and enrollment levels. Its annual *Report of the States* summarizes the trends in these areas. The 1995 publication, in noting that 1993 enrollments declined for the first time in eight years, stated that

> As more of the cost of higher education is being shifted from the state to students in the form of loans, students and their families are more concerned than ever about cost and value....Declining public support of higher education has resulted in increased cost to the student. This has been exacerbated by a shift in student financial aid policy away from grants and toward loans. This has resulted in the increasing price sensitivity finding highlighted above....[States'] initial policy choices have been in the direction of limiting access. (p. 19)

While acknowledging the role that demographics played (see note 1) in the decline, AASCU places much of the responsibility on tuition increases imposed in most states.

Officials in California, which saw some of the nation's highest tuition increases in the early 1990s (see Appendix A for one example), have included tuition increases as one of the reasons for recent enrollment declines. An article in *The Chronicle of Higher Education* (Lively, 1994) compared enrollments in California's public colleges and universities in the fall of 1992 and 1993:

> Some community-college students and officials believe that many students who would have gone to CSU [California State University] in past years went to two-year campuses this fall because tuition is cheaper.... Many community-college students tell of friends who dropped out when tuitions increased, such as a young man who already worked 40 hours a week at United Parcel Service and decided he couldn't work more to pay higher fees at the College of San Mateo... (p. A24).

The article noted that officials attributed at least part of the enrollment decline to cuts in class offerings, i.e., a supply-side effect. It further noted that California was not the only state to see this result from tuition increases:

> A recent report by the Illinois Community College Trustees Association says that enrollments by credit hour fell at 28 of the 39 colleges surveyed in that state this fall. The report speculates that the declines resulted from tuition increases, cuts in courses and student services, and a loss of confidence that college will lead to jobs. (p. A24)

While the observations in these two states are not scientific surveys, they do indicate that policy makers believe that sharp tuition increases do lead to enrollment declines, at least in some sectors of public higher education.

Most multivariate analyses that examine the relationship between tuition and enrollment, generally referred to as student demand studies, fall into two categories: 1) cross-sectional studies, or 2) time-series studies. Cross-sectional studies examine how individual students behave in the face of various postsecondary options. Researchers use multivariate analysis on datasets such as the High School and Beyond survey to measure the impact of tuition and aid on individual students' decisions to attend college or not. These analyses measure how much of the college-going decision is based on price, as compared to other factors.

An alternate methodology is time-series analysis. Time-series studies examine changes over time in aggregate enrollments of students (e.g., in the entire U.S. or in individual states or institutions). These studies relate changes in aggregate enrollments to tuition changes during the given period.

Each approach has advantages and limitations. While cross-sectional studies often have large sample sizes, and therefore much statistical power to examine subsets of data (e.g., racial or income categories), they commonly measure tuition sensitivity at a single point in time. Time series analyses examine behavior over time and thus have the ability of measuring how enrollments change in response to tuition changes in multiple years, but often are unable to track changes in the choices of individual students or groups of students.

A 1988 book by Leslie and Brinkman is often referred to as the classic analysis of student demand studies. They reviewed 25 studies published between 1967 and 1982, including both cross-sectional (five) and time-series (20) analyses and studies that examined different types of institutions, public and private, 2-year and 4-year. The authors calculated an overall student price response coefficient (SPRC), a measure of students' sensitivity to tuition increases. They found that

> The results of all studies were in the expected direction; that is, enrollments declined when prices increased...The average SPRC for the 25 studies was about -0.7; that is, for every $100 increase in tuition price, one would expect...a drop of 0.7 percentage points in the first-time enrollment rate.[4] (p. 125)

The SPRCs the authors calculated from the 25 studies ranged from -0.2 to -2.4.[5]

One serious obstacle to using Leslie and Brinkman's findings to inform current policy is that the studies were conducted when tuition levels were significantly lower than today.[6] Thus, if the tuition demand for higher education is curvilinear, SPRCs today may be larger than what the authors found, indicating that students are more sensitive to tuition increases given tuition levels in more recent years. In addition, most of the studies examined enrollments in only one or two states, or even a single institution, thus limiting the ability to compare policies across states and their effect on access to public higher education.

Even with its limitations, Leslie and Brinkman's meta-analysis was an important contribution to the literature. It confirmed the findings of earlier meta-analyses performed by Jackson and Weathersby (1975) and McPherson (1978). Jackson and Weathersby examined seven studies and found SPRCs from -0.05 to -1.46. McPherson examined ten studies and found SPRCs from -0.05 to -1.53. Both of these ranges are similar to that of Leslie and Brinkman when one takes into account that the SPRCs in the two earlier studies were normalized to 1974 dollars.[7]

Many studies have been published since these three meta-analyses were conducted. Some help fill the methodological gaps left by the earlier studies; many address later cohorts of students. All of them help to shed light on the question of how sensitive higher education enrollment rates are to increases in tuition.

As described earlier, both cross-sectional analyses and time-series studies have limitations. Some authors attempt to overcome them by combining both methodologies to assess the relationship between tuition levels and enrollments.

Kane (1991) used both methodologies to examine the college enrollment patterns of white and black students from two datasets — the National Longitudinal Survey of Youth (NLSY) and

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4 In this and other studies, measures of tuition sensitivity are represented for the "mean" student, i.e., all other characteristics are held to their means.

5 Two studies had positive SPRCs. One of these utilized only descriptive statistics, and the other examined only applicants to community colleges in New York in a single year.

6 1976 was the latest year for which data were analyzed in the studies reviewed by Leslie and Brinkman.

7 See Leslie and Brinkman (pp. 129-131) for a discussion of some of the problems with the Jackson and Weathersby analysis, and its applicability to their own work.

the Current Population Surveys (CPS). The NLSY surveyed youth who were 14 - 22 years old in 1979. Kane used this survey and CPS data from 1970 to 1988. In both datasets, and for both white and black populations, he found that higher levels of tuition were associated with lower enrollment rates (controlling for other characteristics), with the tuition sensitivity higher for black students. For example, using the NLSY data, he estimated that a $1,000 increase in tuition (in 1988 dollars) was associated with a 15 percentage point decline in college entry for blacks and a 13 percentage point decline for whites. He found similar but smaller effects using CPS data.

Kane (1994) tested these conclusions further by performing a similar analysis on the senior cohort of the High School and Beyond (HSB) survey of 1980, with controls for student background characteristics. He found an SPRC ranging from -0.63 to -1.22 for a $100 tuition increase, depending upon the income group examined.

In a later publication, the same author (Kane, 1995) examined changes in tuition and aggregate enrollments in public colleges and universities in each of the fifty states during the period 1980 to 1992, using enrollment data from the Integrated Postsecondary Education Data System (IPEDS) surveys conducted by the National Center for Education Statistics. Controlling for unemployment rates and need-based grant spending in the state, he analyzed the effect of a $1,000 tuition increase (in 1991 dollars) at community colleges and 4-year colleges.[8] By itself, the community college increase results in a drop in total public enrollments in the state of 3.5 percentage points. Similarly, an increase just at the 4-year colleges results in a total enrollment decrease of 1.4 percentage points. These results indicate that students are more sensitive to tuition increases in community colleges, not a surprising result given that these colleges are often the entry point into higher education for the poorest students. This topic will be revisited in chapter 4.

Manski and Wise, in their book *College Choice in America* (1983), conducted a thorough analysis of many of the determinants of demand for higher education. Using data from the National Longitudinal Study of the high school class of 1972 (NLS72), they examined the enrollment effects of tuition changes at 2-year colleges, 4-year colleges, and vocational-technical schools. They found effects in the expected direction, i.e., higher rates of tuition were associated with lower enrollment levels at all three types of postsecondary institutions. In contrast to the

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[8] Since attending college can be a substitute for entering the workforce, many researchers have hypothesized that unemployment may be positively associated with college enrollment, i.e., as employment possibilities lessen, individuals may be more likely to enter college. A countervailing force is that fewer employment possibilities mean that students and their families have fewer funds for financing a college education. See for example Ahlburg, McPherson, and Schapiro (1994), Blakemore and Low (1983), Corazzini, Dugan, and Grabowski (1972), and Jackson (1988).

Kane findings discussed above, they found similar levels of tuition sensitivity between students at 4-year colleges and students at community colleges.

St. John (1990) used cross-sectional analysis to update Leslie and Brinkman's (1988) findings on SPRCs. He analyzed the sophomore cohort of the HSB survey to test tuition sensitivity, controlling for students' background characteristics and financial aid awards. Combining students in all types of institutions (4-year and 2-year, public and private), he found that a $1,000 increase in tuition decreased enrollment rates by 2.8 percentage points. This is lower than Leslie and Brinkman's range of -0.50 to -0.80 for a $100 increase. St. John commented on this difference:

> The lower price-response measures reported here may be attributable to (1) change in SPRCs over time, (2) methodological differences between this study and other studies, or (3) a combination of the two. (p. 171)

Noting that other studies (such as Jackson, 1988, and St. John and Noell, 1989, both described in chapter 3) using similar methodologies to compare SPRCs in the 1970s and 1980s found few differences, St. John concludes that methodological differences in his model specification most likely account for the lower SPRCs he found. The most important methodological difference is that his study includes financial aid in the models. Less than a quarter of the studies in Leslie and Brinkman's volume included financial aid (or net tuition). As described later in this paper, because financial aid does affect enrollment, its existence in a model likely serves to dampen the effects of tuition on enrollment.

Savoca (1990) analyzed the NLS72 data, but used a different methodology than those of most other researchers who used this dataset and similar longitudinal series. She argued that most other studies underestimate the tuition sensitivity of the college enrollment decision because they treat the decision to apply to college as exogenous:

> By treating the application decision as exogenous, they are likely to understate the true price effects, for they ignore the possibility that a change in tuition may affect enrollments through its effect on the decision to apply to college. (p. 123)

Savoca is stating that the level of tuition may be a determining factor in whether a student even applies to college, an effect that would be missed in studies that examine only the tuition responsiveness of students who apply and are admitted to a college.

Treating the application decision as endogenous, Savoca analyzed the same subset of the NLS72 data that was used by Fuller, Manski, and Wise (1982), in which they found a general

SPRC of -0.23 for those students who applied and were admitted to a college.[9] Savoca found that the tuition sensitivity of the decision to *apply* to college was -0.26. As she concluded,

> If we assume that a school's tuition charge and admission policy are set independently, i.e., that admission standards are unaffected by changes in price, then the price elasticity of the probability of enrollment is the sum of these two elasticities, -0.49. Hence, the true elasticity of demand may be more than double the estimates reported in the literature. (p. 128)

Thus, Savoca argues, many other researchers who used similar methodologies to Fuller, Manski, and Wise may also have understated the true tuition sensitivity of the enrollment decision by as much as one half.

McPherson and Schapiro (1991b) analyzed eleven years of aggregate CPS data (through 1989) to examine the enrollment behavior of white students in three income categories. They found a SPRC for lower-income students in all types of institutions of -0.68. While this figure cannot be directly compared to Leslie and Brinkman's because it is based on 1978-1979 tuition rates and is for lower-income students only, the authors conclude that their results "seem broadly consistent with typical cross-section findings" (p. 221).

Shires (1995) used California enrollment and tuition data to calculate tuition elasticities of demand for the three public higher education sectors (community colleges, California State University, and University of California). He calculated elasticities of -0.15, -0.20, and -0.05, respectively. While these tuition elasticities are not mathematically equivalent to SPRCs, the author compared them with elasticities from an earlier article by Leslie and Brinkman (1987), and found them to be consistent with other student demand studies.[10]

An earlier study by this author (Heller, 1994) examined the change in public college enrollment rates between 1984 and 1991 across all fifty states, using data from the IPEDS surveys. Modeling the relationship between tuition and enrollment rates, he found an SPRC of -0.58 for white students and -0.63 for minority students. Controlling for state-awarded grants and local economic conditions lowered these estimates to -0.35 and -0.46 respectively. Both sets of estimates are below the Leslie and Brinkman (1988) SPRCs. As he noted, however, "one would expect this as

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9 The Fuller, Manski, and Wise (1982) study was an earlier version of the work that led to the book, *College Choice in America* (1983), described earlier in this chapter.

10 While an SPRC provides an estimate of the percentage change in enrollment for a tuition increase of a fixed dollar amount, elasticities estimate the percentage change in enrollment for a given *percentage* change in tuition.

the sample used here includes all undergraduates, who are expected to be less price responsive than first-time students" (p. 20), who are the focus of the Leslie and Brinkman meta-analysis.

All the studies described here are consistent in one respect: each found an inverse relationship between tuition and enrollment rates. The exact size of the effect may differ depending upon the methodology used, the dataset analyzed, and the type of students or institutions examined. But the magnitude of the effect is remarkably consistent across most of these studies. The evidence indicates that a tuition increase of $100 is consistent with a drop in enrollment of somewhere in the range of 0.50 to 1.00 percentage points. Again, it is important to note that these changes assume all other variables that affect enrollment demand are held constant. Appendix B summarizes the findings from the studies reviewed in this chapter.

One public policy concern is that these studies measured enrollment effects of tuition increases when levels were much lower than today. As discussed earlier in this chapter, if the demand for higher education is curvilinear, than the SPRCs and elasticities in these studies may be underestimating students' sensitivity to tuition increases today.

Even given this caveat, however, it is clear there is an inverse relationship between tuition and enrollment. Both the cross-sectional and time-series evidence is consistent on this issue.

## 3. The Relationship Between Financial Aid and Enrollment

Analyzing the relationship between financial aid and enrollment in public higher education is a more complex undertaking than looking just at tuition. If one assumes that financial aid is nothing more than the price discount described in the previous two chapters, then students should react similarly to the same-sized increase in financial aid or cut in tuition, since both would result in the same net cost to the student.[11] Unfortunately for policy makers, this does not appear to be the case.

One issue is that "financial aid" is not a singular entity, but is a term that incorporates many different forms of student financial assistance. This includes grants, subsidized loans, unsubsidized (market rate) loans, tuition remission, and work study wages. The net cost paid by the recipient of a $1,000 grant is different than that of a student receiving a $1,000 subsidized loan. Economists would argue that these two could be compared simply by calculating the subsidy value of the loan, and comparing this to the grant. Yet in practice, it appears that students are not always rational economic actors, and they react differently to various forms of financial aid and tuition changes, even if the economic value of each is the same.

There is also evidence that students react to the "sticker price" of the college, either because they are not aware of the existence of financial aid or do not believe they would qualify for it.[12] In a recently issued book, Mumper (1996) summarizes the dilemma facing policy makers who seek to use financial aid to lower the cost of higher education for needy students:

> A plan which may look good in an economics class may prove counterproductive in the real world of college finance. In this view, lower-income students are likely to become discouraged by rapid increases in the "sticker price" of higher education. This occurs because information about tuition levels is much more widely known and available than is information about financial aid programs. (p. 45)

The evidence for this view can be seen in most of the studies described in this chapter. Those studies that analyze the relationship between enrollments and tuition changes compared to financial aid awards generally find different sized effects for each. Similarly, those studies that

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[11] This analogy is complicated somewhat by the fact that there is less evidence confirming that tuition changes are symmetrical, i.e., that a $100 cut in tuition would increase enrollments the same amount that a $100 rise in tuition would decrease them.

[12] For an excellent review of the literature on this topic, see O'Brien (1992).

include different types of aid as explanatory variables (i.e., grants versus loans) find different effects for each type.

The value in these studies is that they can help to inform policy concerning college pricing and access to public higher education. Policy makers, whether at the federal, state, or institutional level, have a number of levers they can adjust to influence the net cost paid by all students or individual students through targeted financial aid. While the exact impact of pulling these levers cannot be known for certain in advance, there is a large body of evidence that can help policy makers use financial aid as a tool for increasing access to higher education. Because most aid is awarded based on financial need, much of the research looks at the relationship between aid and enrollments of lower-income students only.

With the implementation of Basic Educational Opportunity Grants (BEOG) in the 1972 reauthorization of the Higher Education Act (renamed Pell Grants in 1980), the federal government for the first time began to issue need-based financial aid on a large scale.[13] This provided an opportunity for researchers to examine the question of whether widespread availability of financial aid affected enrollment rates.

As with tuition rates, an excellent starting point for assessing the relationship between financial aid and access to higher education is the review conducted by Leslie and Brinkman (1988). These authors examined three types of studies: multivariate analyses of student behavior, calculations of aggregate enrollment (what they term "participation") rates, and student opinion surveys. Because of the wide variety of methodologies used, even within each of the three types of studies, Leslie and Brinkman did not conduct a formal meta-analysis of the impact of aid on enrollment, as they did with the student demand studies. However, they did conclude that

> Student aid, at least in the form of grants, does increase the enrollment of low-income individuals. The results of the participation rate studies do not lend themselves to unambiguous interpretation, but most studies indicate that a greater proportion of eligible low-income individuals were participating in higher education in the early 1980s than prior to the advent of the major federal grant program (BEOG/Pell). (p. 154)

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[13] Earlier programs, such as the Perkins Loan program (created as part of the National Defense Education Act in 1958) and Educational Opportunity Grants (part of the Higher Education Act of 1965), also provided need-based aid. However, the size and scope of these and similar programs were negligible compared to the size of the college-going population until the 1972 reauthorization. Because the BEOGs were not fully funded by Congress until 1974, this year is often used as the beginning of the program. See chapter 4 of Mumper (1996) for a history of the creation of federal financial aid programs.

From their analysis of the econometric analyses, they estimate that in 1982 20% to 40% of the enrollment of lower-income students was due to the existence of grants, and 13% of middle-income student enrollments was due to grants. Adding these two figures together, and adjusting for the relative enrollment rate of each income group, the authors concluded that 16% of all full-time students enrolled in college because of the existence of need-based grants.

Jackson's (1978) analysis of the National Longitudinal Study of the High School Class of 1972 (NLS72) is one of the studies included in Leslie and Brinkman's review. It is notable as one of the first to use NLS72 to model the effect of financial aid on enrollments. Looking just at the awarding of financial aid, he found that "$100 of aid may increase the likelihood an applicant will enroll by 0.76 percentage points" (p. 564), a figure in the range of the various tuition SPRCs described in chapter 2. He found the increase in enrollment actually goes up slightly when you control for a number of student background characteristics. He further disaggregated "aid" into two variables — a binary variable indicating whether the student received any aid at all, and the total amount of aid received. Interestingly enough, he found that the existence of any aid at all had a greater impact on enrollment than did the size of the aid award.

Blakemore and Low (1983) also used NLS72 to analyze whether the mere existence of a financial aid award (regardless of its size) could help to increase college enrollments. Controlling for student background characteristics and public and private college tuition levels in each student's state, like Jackson (1978) they found that awarding financial aid had a large impact on the probability of a given student's enrollment. They looked separately at whites and blacks, and males and females. They found that as the odds that a white male student with mean characteristics receives a scholarship are increased from zero to 50%, the probability of enrollment increases from 17% to 91%. They found similar, though smaller effects for the other groups. The applicability of these results to policy making may be questionable, however, as the authors state that "when the scholarship potential reaches 100%, white males are predicted to enroll 100% of the time, as are black males" (p. 513).

In a later article, Blakemore and Low (1985) again used NLS72 to model the impact on enrollments of a cut in state-awarded financial aid, as well as increases in tuition. The authors found that a 30% cut in aid would result in a decrease in enrollment from 4.7 to 8.5 percentage points, depending upon the demographic group examined. They then modeled the effect of a 15% cut in scholarship aid combined with a 15% increase in tuition. The enrollment declines in this model ranged from 7.7 to 15.1 percentage points. The most draconian policy — a 30% cut in aid combined with a 15% increase in tuition — resulted in enrollment declines of 10.2 to 16.2 percentage points.

One of the most influential articles that analyzed the effect of the BEOG program was by Hansen (1983). He used data from the Current Population Surveys (CPS) to compare overall enrollment rates in 1971/1972 and 1978/1979, periods before and after implementation of the BEOG program. Looking at students from below and above the median income line, he found little improvement in the relative enrollment rates of poorer students in the later period as compared to before the implementation of BEOGs:

> These data force one to conclude that the greater availability of student financial aid, targeted largely toward students from below-median-income families, did little, if anything, to increase access. The results certainly do not accord with expectations that access would increase for lower-income dependents relative to higher-income dependents. (p. 93)

The author confirmed this finding by examining the college enrollment expectations of graduating high school seniors in NLS72 and the senior cohort of High School and Beyond (HSB) survey in 1980. He found no significant differences in the expectation of lower-income seniors in 1980 as compared to lower-income seniors in the earlier cohort, thus confirming the lack of impact of BEOGs.

Hansen provided four possible explanations for these counter-intuitive findings: 1) aid may not have been targeted enough towards lower-income students; 2) aid was not large enough to change behavior of these students; 3) the enrollment rates of lower-income students may have been even *lower* if aid had not been available; 4) the findings may be the result of data and methodology problems.

Hansen's article provoked great controversy, especially for those policy makers and researchers who were invested in the notion that financial aid served to improve access for targeted populations. Many academics conducted studies to confirm or refute Hansen's findings, or at the least, to determine which of his explanations was correct.

Kane (1994) tested Hansen's conclusions regarding the impact of the BEOG program on enrollments. He also analyzed CPS data from two time periods - 1970 to 1972 (before BEOGs), and 1973 to 1977. Like Hansen, he found that the enrollment rates of lower-income students relative to higher-income students did not increase in the later period. Kane proposed an additional explanation for these results to add to those put forth by Hansen:

> Only the otherwise college-bound may have the time and incentive to solve the mystery of eligibility. To the extent that students are unaware of financial aid rules and programs, they [BEOGs] may simply subsidize the otherwise college-bound and such programs may be a pure transfer. (p. 8)

Manski and Wise (1983), in their analysis of NLS72, came to a different conclusion than did Hansen and Kane. They found that

> The BEOG program was responsible for a truly substantial increase (59 percent) in the enrollment rate of low-income students, a moderate increase (12 percent) in middle-income enrollments, and a minor increase (3 percent) in the rate for upper-income students. (p. 125)

Noting that the induced enrollments were almost entirely concentrated in 2-year colleges and vocational schools, they concluded that

> The effect of the BEOG program may be to induce a substantial number of high school graduates who would otherwise have chosen the labor force, the military, or homemaking to enroll, instead, at two-year colleges and vocational schools. (p. 126)

McPherson and Schapiro (1991a) pointed out three limitations of Hansen's analysis:

> Year-to-year fluctuations may obscure underlying trends, so that increasing the number of years in the comparison is helpful....Controlling for variation in other factors that affect the demand for enrollment is not possible with this method....This kind of comparison is not responsive to changes over time in the targeting of student aid. (p. 311)

Their concern with the last point was that the targeting of student aid changed drastically in the late 1970s, as middle- and upper-income students became beneficiaries of the federal aid programs for the first time. These explanations equate most directly with Hansen's fourth explanation of his findings.

To test their hypothesis, McPherson and Schapiro (1991b) in another study analyzed data from the CPS for the 11 year period from 1974 to 1984, looking only at white students. They measured the effect on the enrollment rate of lower-income white students of a $100 increase in tuition, financial aid, and net cost (tuition less aid). They found that a $100 increase in any one of these measures led to a change in enrollments of 0.70 percentage points in the expected direction -- increases in tuition and net cost decreased enrollments, and increases in financial aid increased enrollments.[14] While they noted that their findings showed less of an effect than found by Manski and Wise (1983), they noted that "our result...seems broadly consistent with typical cross-section findings" (p. 53).

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[14] The coefficient of financial aid alone was not statistically significant for all types of institutions, but was when they examined private institutions alone (coefficient of 0.38).

Some researchers analyzed separately the enrollment effects of different types of financial aid awards. Moore, Studenmund, and Slobko (1991) examined applicants to Occidental College, in their terms a "selective college," in 1989. They found that for those students who applied for financial aid, a $1,000 increase in grants would increase the probability a student would enroll by 7.8 percentage points. They found a similar-sized effect for a decrease in the net cost (tuition minus grants). In comparison with grant awards, they found that changes in the size of loan or work study offers had no effect on enrollments. The authors concluded that "tuition and scholarships affect the probability of enrollment of financial aid applicants, but that loans and work-study have no significant effect" (p. 311).

Schwartz (1985) performed a similar comparison of the enrollment effects of grants versus loans. He analyzed the HSB senior cohort to calculate separately the effect on enrollment of changes in grants and loans from public and private sources. Like Moore et al., he found that an increase in grants increased the probability of enrollment, at least if awarded from public sources. The value of a loan subsidy, from either public or private sources, had no statistically significant impact on enrollment (Schwartz did not include in his published models the total amount of the loan). In confirmation of the findings described in chapter 2, Schwartz found that an increase in the sticker price of tuition led to a decrease in the probability of enrollment.[15] Unlike Moore et al., however, he found that an increase in publicly awarded grants had an enrollment effect approximately three times that of a similarly sized tuition decrease. In making this comparison, however, he offered this warning:

> The marginal effects are evaluated at the mean values of all variables in the estimation and higher income groups, those with incomes above the mean value of parental income, are estimated to receive no public grants. Thus the comparison between the marginal effects of a tuition change, where tuition is relatively constant over income groups, and public grants, which vary substantially over parental income groups, is not completely appropriate. (p. 138)

Schwartz summarized his findings on loans by stating the "the policy implication is that market interest rates could be administered with possibly no significant changes occurring in college enrollments" (p. 138).

St. John (1990) criticized Schwartz's analysis because of his use of a proxy for the actual tuition charges faced by each student (see note 13). St. John used the HSB sophomore cohort to

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[15] It should be noted that Schwartz used the tuition and fee cost of the public 4-year college or university in the student's home state as a proxy for actual tuition charges.

answer some of the same questions regarding the effect of tuition and financial aid on enrollment.[16] Controlling for background characteristics such as ability and socioeconomic status, he modeled the change in the probability of enrollment given changes in tuition, grants, loans, and work study awards. He found that all four of these variables affected the probability of enrollment as shown in Table 1.

**Table 1: Relationship Between Tuition, Financial Aid, and the Probability of Enrollment in Higher Education, 1982**

| $1,000 Increase In: | Predicted Change in Probability of Enrollment (Percentage Points) |
|---|---|
| Tuition | -2.8 |
| Grants | 4.3 |
| Loans | 3.8 |
| Work Study | 4.6 |

Note: All variables significant at a level ≤ .05
Source: St. John (1990)

Like Moore et al. (1991), St. John found similarly sized effects of tuition and financial aid. This is in contrast to Schwartz's findings of a much greater effect of grants than tuition changes. But unlike in both of those studies, St. John found that enrollments were sensitive to changes in loans and work study, as well as grants. While the author did not state if he tested whether the sizes of the effects were significantly different from one another, he did conclude that "on a dollar-for dollar basis, all forms of aid are at least as effective as tuition decreases in promoting enrollment" (p. 168).

Jackson (1988) performed cross-sectional analysis on datasets from two points in time — NLS72 and the HSB senior cohort — to examine whether the determinants of the demand for college changed during the 1970s. His analysis examined many variables besides whether the student received any type of financial aid, including race, gender, region of the country, ability, and family income and socioeconomic status. Controlling for other factors, he found that financial

[16] St. John's findings on tuition effects were described in chapter 2.

aid recipients were 6.5 percentage points more likely to enter college in 1972, and 7.8 percentage points more likely in 1980. Jackson concluded that

> High-school seniors, as a group, decided whether to enter college in 1980 much as they had in 1972....Many federal programs of the time were supposed to increase college participation among groups traditionally underrepresented: the poor, particularly, and disadvantaged minorities. Whether these programs had the desired effect — the evidence is somewhat controversial at this point, although the consensus is that they did — they produced neither an overall change in enrollment rates nor a substantial change in overall choice patterns. (p. 25)

St. John and Noell (1989) extended Jackson's analysis by examining students from NLS72, the HSB senior cohort, and the HSB sophomore cohort, thus giving them a comparison for three points in time — 1972, 1980, and 1982. These authors looked at the effects of each type of financial aid (grants, loans, and work study) separately, along with any combination of two or more types of aid. The question variable was whether the student received that type of aid, not the size of the aid award. A summary of their findings is shown in Table 2. The authors concluded that

> In all three years, financial aid offers with work only and packages with two or more types of aid had a slightly stronger impact than offers with scholarships or loans as the only source of aid. However, these differences are slight. Therefore, we conclude that all forms of aid were effective in promoting access in all three time periods. (p. 574)

**Table 2: Relationship Between Financial Aid and the Probability of Enrollment in Higher Education in 1972, 1980, and 1982**

| | Predicted Change in Probability of Enrollment (Percentage Points) | | |
|---|---|---|---|
| Type of Aid | 1972 | 1980 | 1982 |
| Grants | 6.2 | 10.1 | 6.2 |
| Loans | 10.8 | 9.5 | 7.8 |
| Work Study | 14.9 | 11.0 | 9.7 |
| Combination | 14.7 | 8.2 | 9.5 |
| Percentage Receiving Any Aid | 26.8% | 30.7% | 35.2% |

Note: All variables significant at a level ≤ .05

Source: St. John and Noell (1989)

Unlike Jackson, however, these authors reached the conclusion that the implementation of the BEOG program *did* improve access. Because aided students were more likely to attend college, and since more students overall received aid in 1980 and 1982, as compared to 1972 (shown in the last row of Table 2), they concluded that the BEOG program helped increase access to college.

Multivariate analyses are not the only means researchers use to examine the effect of financial aid on college enrollments. The UCLA Freshman Survey described in chapter 2 also asked students about the importance of financial aid on their enrollment decision. From 1980 to 1994, the emphasis students assigned to aid grew at a rate higher than any of the other 18 factors (Mortenson, 1995). The number of students rating financial assistance as "very important" grew from 16.2% to 29.6% during this period. These results likely understate the importance of financial aid to students since the survey covers only those students who actually enrolled full-time in college. Because many potential students did not attend college (at least in part due to inadequate financial aid) or attended only part-time, a similar survey of all college-age youth would likely find even greater importance placed on financial aid.

*College Debt and the American Family*, a report issued by The Education Resources Institute and The Institute for Higher Education Policy (1995), presented the results of their national survey of college borrowers. Over 50% of the respondents indicated that taking on additional debt or major expenses would pose a serious financial risk for their household, and 20% indicated that increasing debt loads have caused the student to consider leaving school. Because they only surveyed students who were already borrowers, the results cannot be used to gauge how many students never enroll because of concern over taking on debt. But these results do indicate that those students who do take on loans to finance their college education are concerned about their ability to pay them back.

Orfield and Ashkinaze (1991), in their report on the Metropolitan Opportunity Project, examined the enrollment of black students in Georgia during the 1970s and 1980s. While acknowledging the possible effects of other social factors, they ascribed at least part of the decrease in enrollment of black students (at the same time that white enrollments were increasing) to "erosions in financial aid...[and] very rapid tuition increases" (p. 172).

The evidence regarding the relationship between financial aid and access to higher education is more complex than the findings on tuition described in chapter 2. While difficult to generalize, those researchers who conducted cross-sectional analyses of the major longitudinal datasets (NLS72, NLSY, and HSB) found that students were sensitive to aid awards when they made the decision to enroll in college. The level of that sensitivity varied from study to study,

depending upon the type of aid (grants, loans, or work study) and dollar value of the aid. The effect that aid has on enrollments is difficult to compare with that of tuition; while some of these studies found similar effects between the two (i.e., a $100 increase in aid would have roughly the same effect on enrollments as a $100 decrease in tuition), others found students to be less sensitive to aid than tuition.

The evidence from the time-series studies is more mixed, however. Hansen's 1983 article which compared enrollments before and after the creation of the BEOG program concluded that the grants had no significant effect on access. His findings were echoed by Kane, at least in his 1994 article. Others, including McPherson and Schapiro (1991a) and Manski and Wise (1983) came to different conclusions, based on different interpretations of the data. Appendix C summarizes the findings from the studies reviewed in this chapter.

There is strong evidence from the cross-sectional studies that financial aid awards do affect enrollments, and some of the post-Hansen researchers have provided compelling explanations for his inability to find such an effect. The topic deserves further study to uncover the complexity of the relationship between financial aid and enrollment.

## 4. Effects of Tuition and Financial Aid on Students of Different Incomes, Races, and in Different College Sectors

While the evidence is clear that both tuition prices and financial aid awards affect access to public higher education, it is important to understand if students with varying characteristics react differently to changes in tuition and aid. For example, do students from wealthier families have the same sensitivity to tuition increases as do those from poorer families? Do white students react to financial aid awards in a fashion similar to black students?

These questions are important because of the targeting effects of financial aid versus the broader effects of tuition. While all students at a given institution are affected by tuition increases, financial aid can be narrowly focused through eligibility requirements. Thus, it is important to understand how different types of students react to changes to both tuition and financial aid.

A related question is whether tuition and financial aid changes have the same effect on access to different kinds of institutions, i.e., community colleges as compared to 4-year institutions. For example, does the awarding of a $500 grant to a student at a community college have the same effect on that student's probability of enrollment as does a similar award made by a baccalaureate institution?

Many of the studies described in the previous two chapters addressed one or more of these questions. Researchers have recognized the importance of group differences in these issues, and they have attempted to distinguish what effect those differences have on students' enrollment decisions.

### Effects of Tuition and Financial Aid on Students of Different Incomes

All other things being equal, a student with more financial resources (of her own or from her family) should be less sensitive to tuition increases than would a student who had to make significant financial and other sacrifices to afford a college education. Similarly, the marginal utility of a scholarship should be greater for this latter student than for the former, because of the discounting action of the scholarship. Since poorer students have access to fewer funds to pay for college, the probability that they would enroll in college would likely decline more for every unit increase in net cost, as compared to wealthier students. In economic terms, the poorer student would

be described as having a more elastic demand for higher education. The difference between two such students can be seen in Figure 1.

$D_p$ represents the demand curve of a poor student, and $D_w$ the demand curve of a wealthy student.[17] At a very low tuition level, such as $T_1$, both students have a probability of enrollment, $P_1$, that is very close to one. At this level, tuition alone is not a barrier to entry for either student. As the price rises, to $T_2$, the wealthier student would see a small drop in her probability of enrollment to $P_2$. The probability of enrollment of the poorer student, who has fewer resources to pay for college and is therefore more sensitive to tuition increases, would drop closer to zero, to $P_3$.

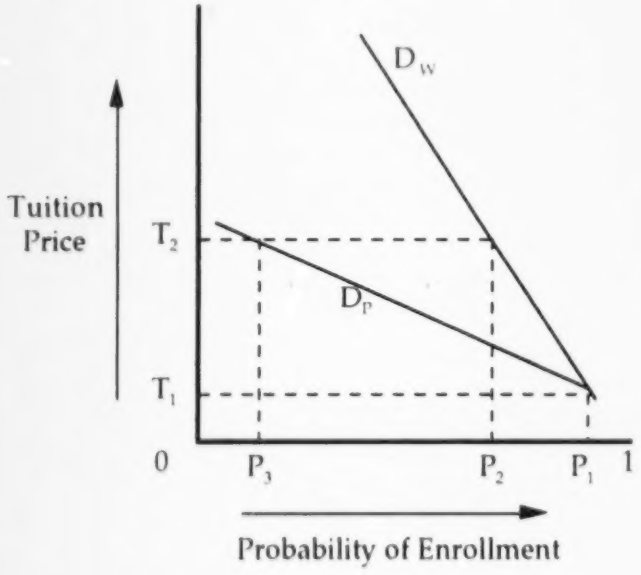


**Figure 1: Higher Education Demand of Poor and Wealthy Students**

Most research on this topic has confirmed that these assumptions from economic theory do hold in practice. Students from lower-income families do tend to be more sensitive to tuition and aid when making undergraduate enrollment decisions than do those from upper-income families. Besides confirming these relative relationships, researchers seek to determine more precisely what the respective tuition (and aid) elasticities of demand are for students of different income

[17] For simplicity of this example, the demand curves are assumed to be linear.

levels. Calculating these elasticities can allow policy makers to predict with some degree of certainty what the impact of proposed tuition and aid changes will be on students from different income categories.[18]

An early article by Corazzini, Dugan, and Grabowski (1972) examined these relationships. They analyzed two datasets — Project Talent, a national cross-sectional survey of high school sophomores conducted in 1960 by the American Institutes for Research, and a survey of 4,000 Boston-area students in 1969 — to determine the effect of such variables as tuition, unemployment rates, ability, and socioeconomic status on higher education enrollment rates. In the analysis of both surveys, the authors found that students from lower-income families were less likely to enroll, controlling for the other factors in their models:

> It is quite clear that family income is important in determining who enters the market for a college degree. Beyond environmental effects, family income serves, at least in part, as an effective bypass to the imperfections of the capital market with the end result that students from low-income families — even when qualified — are often unable to attend college. (p. 56)

What they are saying is that even controlling for academic merit, poor students were less likely to attend college than wealthier students. It is important to note that both datasets analyzed by these authors were from before the implementation of the Basic Educational Opportunity Grant program in the 1970s, though state scholarship programs did exist then.

Another article from the 1970s, by Jackson and Weathersby (1975), reviewed seven student demand studies. As described earlier, they found that students in general were sensitive to tuition increases. Regarding differences in income, they concluded that, "Individuals from low-income families are more affected by price changes than are individuals from high-income families" (p. 647). They cited one example from the studies they reviewed. The student price response coefficient (SPRC) for a student from a median income family ($12,000 in 1974 dollars) was calculated to be -1.4, indicating that a $100 tuition increase would result in a drop in enrollment of 1.4 percentage points. For a student with a family income of $9,000, the SPRC was -2.0, or 43% greater.

With the creation of the National Longitudinal Survey of 1972 (NLS72) and the High School and Beyond Survey of 1980 (HSB) by the National Center for Education Statistics, researchers had national, representative samples of students that were large enough to examine differences between students of different income levels (and other characteristics, such as race,

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[18] Again, it is important to note that these relationships are discussed *ceteris paribus*.

described below). An additional feature of these surveys is that they contained information about the financial aid awards to students who attended college. These data allow researchers to determine whether financial aid helped to eliminate the differences in the demand curves for poor and wealthier students.

The effect of financial aid can be seen by examining the demand curves of poor and wealthy students shown earlier. Figure 2 shows the same two curves, $D_p$ and $D_w$. A new curve, $D_{p'}$, represents the demand curve of poor students after the effects of financial aid are taken into account. While the slope of the curve stays the same ($D_{p'}$ is parallel to $D_p$), the curve shifts upward so that at any given tuition level, the probability of enrollment is greater. For example, at a tuition price of $T_1$, the poor student without financial aid would have a probability of enrollment of $P_1$, while that same student with financial aid would have an enrollment probability of $P_2$, similar to that of the wealthier student.

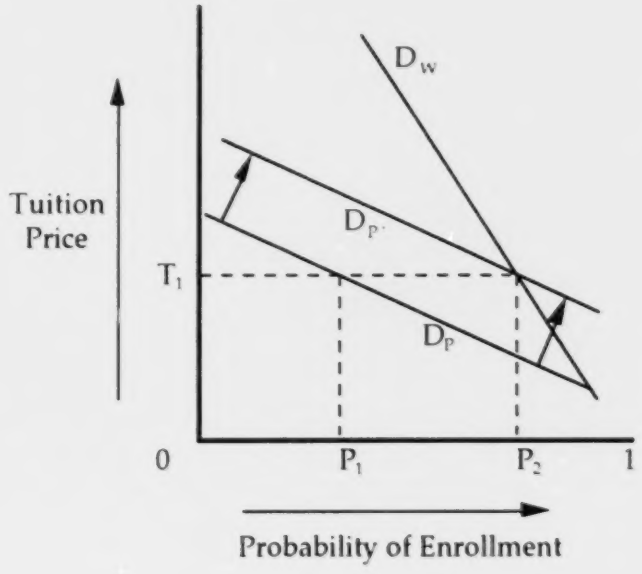


**Figure 2: Higher Education Demand of Poor and Wealthy Students, Showing Effect of Financial Aid**

One of the questions researchers in this arena seek to address is, How much does financial aid serve to shift the demand curve of recipients? Since the majority of aid is awarded based on

financial need, does it actually eliminate all barriers to entry for poorer students, or does it eliminate only part or none of the gap?

A number of researchers have used the NLS72 and HSB datasets to answer these questions. Manski and Wise (1983) used NLS72 to model the effect of the Basic Educational Opportunity Grants (BEOG) program on the enrollments of lower- (income below $16,900), middle-, and upper-income (above $21,700) students in 1972.[19] They distinguish in their analysis between those BEOG recipients who would have attended college without the grant, and those for whom receipt of the grant induced them to enroll. The results predicted by their model for the nation as a whole are shown in Table 3. The authors found that the BEOG program induced the enrollment of 41% of the lower-income recipients, while only 5% of the upper-income recipients would not have enrolled without the grant. These results indicate that poorer students are much more sensitive to the receipt of a grant than are their wealthier counterparts.

**Table 3: Predicted Distribution of BEOG Recipients Between Induced and Existing Enrollees, 1972**

| Income Group | BEOG Recipients | Induced Enrollees | Percentage Induced |
|---|---|---|---|
| Lower | 534,000 | 220,000 | 41% |
| Middle | 265,000 | 44,000 | 17% |
| Upper | 296,000 | 15,000 | 5% |
| Total | 1,095,000 | 279,000 | 25% |

Source: Manski and Wise (1983).

Blakemore and Low (1985) modeled the enrollment effects of cuts in state-awarded financial aid and increases in tuition using the NLS72 dataset. Using three income groupings, less than $5,000, less than $15,000, and less than $25,000, and different ability levels, they found that the enrollment drop was greatest for the poorer students.[20] Depending on the magnitude of the aid cuts and tuition increases, the probability of enrollment of the poorest students in the middle

[19] These income groupings are not intended to distribute all students evenly, but rather, are a distribution of those students who received BEOGs.

[20] Median income of the NLS72 families was approximately $12,000 (Jackson and Weathersby, 1975, Table 8).

ability group dropped in a range of 3.5% to 24.3%, while the probability of the wealthiest students dropped only 1.1% to 8.3%.

Schwartz (1986) also looked at whether financial aid has served to eliminate the enrollment gap between poor and wealthier students, a concept coined "wealth neutrality" by Feldstein (1975). Schwartz describes "wealth neutrality:"

> The underlying principle is that certain categories of services, such as education and health care, are deemed fundamental interests and that consumption of these services should not have a strong relationship to an individual's ability to pay...Wealth neutrality is defined for the purposes of this paper as an equal probability of college attendance across income groups. (pp. 107-108)

Schwartz analyzed HSB to determine whether financial aid helped create wealth neutrality. Dividing students into income quintiles, he modeled the change in the probability of enrollment for each group given a $100 decrease tuition and a $100 increase in financial aid, controlling for ability, socioeconomic status, and other student background characteristics. For the tuition decrease, he found that students in the top two income quintiles would increase their enrollment probability by less than 0.1 percentage points, while students in the bottom three quintiles were not affected. While the wealthier students did appear to be slightly sensitive to tuition increases, he theorized that a cut in tuition of this magnitude for poorer students would likely be offset by a similar-sized cut in their aid award, thus leaving the net cost to the student the same.

Schwartz found that the $100 grant increase had the effect of increasing the enrollment probability of the lowest three income quintiles by 0.2 percentage points. The same grant increase had no impact on the enrollment of students in the top two quintiles, presumably because they were ineligible for most grants, which are awarded based on need. From his analysis, Schwartz concluded that state and federal policies that awarded financial aid based on need did help to create more wealth neutrality in higher education by helping to equalize the enrollment rates of lower- and upper-income students.

Leslie and Brinkman (1987), in their *Journal of Higher Education* article that was the forerunner to their book, discussed briefly their findings concerning income levels. A number of the 25 student demand studies they reviewed that analyzed the relationship between tuition and enrollment looked at students of different income levels. They found that these studies were consistent in their finding of a higher level of price sensitivity for lower-income students, with price sensitivity generally lessening as income rises. While they theorized that the increasing availability of financial aid should help to lessen these differences among income groups, they

concluded that the evidence was only just becoming available (at the time of their review) to confirm this effect.

McPherson and Schapiro (1989) analyzed Current Population Survey data from 1974 to 1984 to examine if tuition and aid sensitivities differ by income level.[21] For a sample that included students in both public and private institutions, they found that those in the lowest income group were sensitive to tuition increases, with a $100 increase resulting in a decrease in enrollment of 0.68 percentage points. These same students had no statistically significant reaction to a similarly sized decrease in financial aid. For middle- and upper-income students, McPherson and Schapiro found no effect of aid on their enrollment rates, and as they labeled it, the "perverse" (p. 41) result of a *positive* relationship between tuition increases and enrollment. They offered no explanation for this counter-intuitive result, but did conclude that "Our most important and reliable finding is that increases in the net cost of attendance have a negative and statistically significant effect on enrollment for white students from low income families" (p. 42).

St. John (1990), in his analysis of the HSB sophomore cohort, divided students into four income categories and analyzed the effect of tuition and aid changes, controlling for student background characteristics. He modeled the effects on the probability of enrollment of a $100 decrease in tuition and a $100 increase in grants or loans. The results are shown in Table 4.

**Table 4: Percentage Point Change in the Probability of Enrollment in Higher Education for Students of Different Income Levels, 1982**

| Income Group[22] | $100 tuition decrease | $100 grant increase | $100 loan increase |
|---|---|---|---|
| Less than $15,000 | 0.34 | 0.88 | NS |
| $15,000 - $24,999 | 0.39 | 0.35 | 0.53 |
| $25,000 - $39,999 | 0.31 | 0.33 | 0.63 |
| Above $40,000 | 0.14 | NS | NS |

Note: NS = not significant. All other variables significant at a level ≤ .05
Source: St. John (1990)

[21] This study looked at white students only, due to small sample sizes of minority students in the CPS. Students were divided into three income groups: low, medium and high.

[22] Median income of 4-person families in 1982 was $27,619 (U.S. Bureau of the Census, 1995).

St. John found similar levels of tuition sensitivity for all but the wealthiest students, who were much less sensitive to tuition changes than were the other three groups. The poorest students responded more strongly to grant increases, probably because they were the group most likely to receive aid. Loans were an incentive to enroll only for students in the two middle-income groups. An interesting finding was that the poorest students reacted much more strongly to grant increases than to tuition decreases. This may have been because any tuition changes would be at least partially offset by a change in the size of the grant awarded to the student, and may be an indication that students who received grants were responding more to the net cost, rather than the sticker price.

McPherson and Schapiro (1994a) used the American Freshman Survey, described in chapter 2, to examine changes in the enrollment of students of different income levels between 1980 and 1993. They found that lower-income students were becoming more clustered in community colleges:

> One of our most interesting findings is the increasing representation of low income students at public two-year colleges, and the declining representation of middle and upper income students there...these data do seem worrisome. They suggest that the combined effects of tuition increases and limitations on federal student aid may be impairing the ability of low income students to gain access to institutions other than community colleges. (p. 14)

While they did not conduct a traditional multivariate analysis to reach this conclusion, the authors ascribe this shift of poorer students into community colleges to greater tuition and aid sensitivity.

All these researchers concluded that there is a relationship between income and sensitivity to tuition and financial aid. While the sizes of the effects differ across studies, they find that poorer students are more sensitive to increases in net cost, whether those increases take the effect of tuition increases or financial aid decreases. These findings confirm the theoretical examples provided in Figures 1 and 2. Tuition increases that are not offset by concomitant increases in financial aid appear to have the effect of reducing access to higher education for our country's poorest students.

Appendix D summarizes the findings from this section and the subsequent two sections.

**Effects of Tuition and Financial Aid on Students of Different Races**

The previous section described how students of different income levels react to changes in tuition and financial aid. Another question addressed by many researchers is, "How do tuition and aid changes affect students of different races?"

There are at least three explanations for why students of different races may have varying sensitivities to tuition and financial aid changes. The first is that race may be a proxy for income. If students of one race tend to be at one end or the other of the income distribution as a group, they would have higher education demand curves that are similar to those of a given income group as a whole. There is some evidence for this, at least based on national statistics. Table 5 presents data from the U.S. Bureau of the Census on median family income nationally by race for selected years since 1972.

The data in Table 5 show that white families since 1980 and Asian families since 1990 have similar incomes that are at least 150% that of blacks and Hispanics. In addition, since 1990, incomes of whites and Asians have continued to grow, while that of blacks and Hispanics has stagnated. This coincides with the period of large increases in public college tuitions described in chapter 1. Other measures of socioeconomic status besides income, such as mother and father's educational levels, tend to show similar patterns and likely work to reinforce the effect of income on the demand for higher education.

**Table 5: Median Family Income by Race Since 1972, Current Dollars**

| Year | White[23] | Black | Hispanic | Asian |
|---|---|---|---|---|
| 1972 | $11,694 | $6,864 | $8,183 | NA |
| 1980 | $22,336 | $12,674 | $14,716 | NA |
| 1990 | $38,239 | $21,423 | $23,431 | $42,246 |
| 1993 | $41,110 | $21,542 | $23,654 | $44,456 |

NA = Not available

Source: U.S. Bureau of the Census (1996).

[23] The category "White" includes white, non-Hispanic origin families.

It is important to note that these are national, median figures. The distribution of incomes within each race may differ, as may the distribution in particular states or regions of the country. Nevertheless, the data show that there are significant differences in average incomes between races. An analysis of college dropout races by the General Accounting Office (1995) noted that, "Minorities are overrepresented among low-income families, so their rates serve as a reasonable proxy for low-income students' graduation rates" (p. 6).

The second reason why students of different races may react differently to changes in tuition and aid in the aggregate may be because they have different ability levels. Many of the student demand studies that analyzed cross-sectional datasets have found that higher ability students tend to have higher college enrollment rates, when controlling for family income.[24] The whole issue of race and ability is fraught with political landmines, and is not a central question in this analysis. However, aggregate SAT scores, which are used as measures of ability by most colleges 4-year colleges and universities, show large differences between races. Table 6 summarizes these differences.

**Table 6: Combined Verbal and Math SAT Scores by Race Since 1975**

| Year | White | Black | Hispanic[25] | Asian |
|---|---|---|---|---|
| 1975-1976 | 944 | 686 | 773 | 932 |
| 1980-1981 | 925 | 694 | 770 | 910 |
| 1984-1985 | 939 | 722 | 793 | 922 |
| 1990-1991 | 930 | 736 | 786 | 941 |

Source: National Center for Education Statistics (1992).

As with incomes, the profile of Asian students looks similar to that of whites, and black students' scores are closer to those of Hispanics. Measures of ability from other types of standardized tests show similar patterns. Regardless of one's view on the validity of these tests, the reality in the educational marketplace is that 1) colleges use these scores to assess students' academic abilities, and 2) these scores send signals to students about their own ability and preparedness for college.

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[24] See for example Behrman, Kletzer, McPherson, and Schapiro (1992); Schwartz (1986); and Jackson (1990). Becker (1993) has an excellent explanation of the theoretical link between ability and college entry.

[25] Average of Mexican-American and Puerto Rican scores.

Higher ability students may see themselves more as "college material," and be more likely to make the financial sacrifices necessary to attend college if they perceive a better chance for success through graduation and subsequent entry into labor markets. Thus, if race is acting as a proxy for ability (perceived or actual), then students from particular racial groups may have different price elasticities because of differences in ability.

The last major explanation for differences in demand curves between racial groups is because of different "tastes" for higher education among these groups. It is these "tastes" for any good or service that help to shape the demand curve for that product. Irrespective of any differences in income or ability, people with different racial and cultural backgrounds may place different values on attending college. These values can determine how much a family is willing to invest in a college education. Karen (1991), for example, describes how the "political mobilization" of blacks from 1960 to 1976 may have helped to increase their college participation rates. This action could have helped to change the "taste" for higher education among this group. Again, the sociological question of how much different groups value higher education is not central to this paper, but it is important to note that such differences between races can affect their relative sensitivity to changes in tuition and financial aid.

One way to test whether tuition and aid differences between the races is due to income or ability levels is by including controls for these two measures in multivariate models. If family income, socioeconomic status, and ability are included in the model, and differences between the races still exist, then one can conclude that the differences are due to varying "tastes" for higher education or some other unobserved factor.

Many researchers have examined differences in the sensitivity to tuition and aid changes among racial groups.[26] Behrman, Kletzer, McPherson, and Schapiro (1992) analyzed the NLS72 survey, comparing the tuition sensitivity of white students with that of a sample of black and Hispanic students together. Controlling for student background characteristics (including parents' education, family income, and ability) and labor market conditions, they estimated the probabilities that a student would not enroll in higher education, enroll in a 2-year college, or enroll in a 4-year school. As a measure of college cost, they used the average in-state tuition at a 4-year college in the student's state of residence. They found that the enrollment of black and Hispanic students in 2-year colleges reacted *positively* to tuition increases, but their enrollment in 4-year schools was not related to tuition. This may indicate that higher tuition at baccalaureate

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[26] The studies reviewed in this section analyzed the experiences of white, black, and Hispanic students. Very few student demand studies have examined other racial groups, largely because of small sample sizes in the major cross-sectional datasets.

institutions was pushing black and Hispanic students who otherwise would enroll there down into community colleges.

The authors found that white enrollments in 2-year institutions did not respond to changes in tuition, but interestingly enough, white enrollments in 4-year colleges reacted *positively* to tuition increases there. They concluded that for these students, "price is capturing a quality effect here for which we are unable to control" (p. 14). In other words, they theorized that higher-priced institutions were sending a signal of higher quality to students, thus providing more incentive for them to enroll there. This incentive had to have been large enough to offset any negative effect caused by students' inability to pay the higher tuition.

St. John and Noell (1989) examined white, black, and Hispanic students from the HSB sophomore and senior cohorts to measure the effect of financial aid on enrollment.[27] They also included controls for socioeconomic status, family income, and ability. They found that black students were the most responsive to financial aid offers, followed by Hispanic students and then whites. Their findings are summarized in Table 7.

**Table 7: Change in the Enrollment Probability of White, Black, and Hispanic Students When Offered Financial Aid, 1980 and 1982**

| | Predicted Change in Probability of Enrollment (Percentage Points) | | | | | |
|---|---|---|---|---|---|---|
| | 1980 | | | 1982 | | |
| Type of Aid | White | Black | Hispanic | White | Black | Hispanic |
| Grant | 8.9* | 17.7* | 14.1* | 4.2* | 15.0* | 3.8* |
| Loan | 8.8* | 14.5* | 12.3 | 7.2* | 11.2* | 13.1* |
| Combination[28] | 7.1* | 11.9 | 16.9 | 8.1* | 18.6* | 15.0 |

Note: * = significant at a level ≤.05.

Source: St. John and Noell (1989).

White students in 1980 who received grants alone had a probability of enrollment 8.9 percentage points greater than that of white students receiving no aid. Black students in 1980

[27] This study also examined students in NLS72, but because of small sample sizes of minorities in this survey, they reported results by race only for the two HSB cohorts.

[28] Including work study.

received almost twice the incentive from grants, with their probability of enrollment increasing 17.7 percentage points over unaided Black students. The authors concluded that, "Student aid appears to have a stronger impact on college attendance by blacks and Hispanics than whites" (p. 578). They did not explain, however, the drop in the effect of grants among all three groups from 1980 to 1982.

Jackson (1989) also analyzed the HSB senior cohort to ascertain similar differences among white, black, and Hispanic students. Controlling for similar background characteristics as St. John and Noell, he found that black enrollments responded most to financial aid offers. Blacks who received grants had a probability of enrollment 11.2 percentage points greater than unaided black applicants. In comparison, a white student who received a grant was 6.3 percentage points more likely to enter college than an unaided white. Hispanic students who received grants were no more likely to enter college than their counterparts who did not receive grants.

A possible explanation for the difference in these findings from those of St. John and Noell is that Jackson included in his model a construct of "college tendency," which was a composite of student background characteristics he used to predict whether the student would apply to college or not. It was the inclusion of this construct that likely caused the finding that aid had no effect on Hispanic college entry. When Jackson dropped this variable from his models, he found that the reaction of Hispanic students to grant offers was between that of whites and blacks. As the author concluded:

> Black students remain the most responsive to scholarship awards, the effect being about twice as large as it is for White students, but the response of Hispanic students cannot be distinguished from the effect of their family and academic backgrounds. (p. 24)

Jackson found that the existence of a loan provided no statistically significant incentive to enroll for any of the three groups.

Kane (1991), in his analysis of Current Population Survey data from 1970 to 1988, compared the responses of white and black students to tuition, Pell Grants, and the net cost of college. His models included controls for socioeconomic status and family income, but not ability. With all three measures of college costs, he found that the enrollment of blacks was more sensitive than that of whites. The difference in the respective sensitivities was greatest for tuition, indicating that sticker price is much more of a barrier to enrollment for blacks than for whites.

The earlier study by this author (Heller, 1994) was a state cross-sectional analysis comparing the change in public college enrollment rates from 1984 to 1991 of white and minority (black and Hispanic) students. The models included as dependent variables the change in public

college tuition, state need-based grants per capita, and unemployment rates. In every model, minority students were more sensitive to tuition increases than were white students, with the gap largest when grants and unemployment were used as controls. Table 8 summarizes these findings.

**Table 8: White and Minority Student Responses to Tuition Increases Between 1984 and 1991**

| | Percentage Point Change in Enrollment Rate Per $100 Increase in Tuition | | |
|---|---|---|---|
| Model | Minority | White | Gap |
| Tuition only | -0.63* | -0.58* | 0.05 |
| Tuition and Grants | -0.64* | -0.57* | 0.07 |
| Tuition, Grants, and Unemployment | -0.46* | -0.35 | 0.11 |

Note: * = significant at a level ≤.05.
Source: Heller (1994).

The evidence from the studies described in this section is that black students are more sensitive to college costs than white students, even controlling for income, socioeconomic status, and ability. For Hispanic students, the evidence is more mixed. While some authors found that Hispanic students tended to react to tuition and aid changes in a fashion similar to that of black students, others found a different response. These differences warrant further investigation.

**Effects of Tuition and Financial Aid on Enrollment in Different Sectors of Higher Education**

Higher education in the United States is a very heterogeneous market. In 1992, over 12 million undergraduates attended college in the United States (National Center for Education Statistics, 1994). Approximately ten million, or 83%, attended public institutions, with 46% of these in 4-year colleges and universities, and 54% in community colleges. Given the quite different missions of community colleges and baccalaureate institutions, as well as the differences in how their graduates fare in labor markets, an important question for researchers and policy makers is whether students in each of these sectors react differently to changes in tuition and financial aid.

All other things being equal, one would expect students at community colleges to be more sensitive to tuition and aid than students at 4-year colleges. This is because lower-income students are over-represented in community colleges, and as discussed earlier in this chapter, lower-income

students are more sensitive to price increases.[29] Minority students also are over-represented in community colleges.[30]

In contrast to the other questions reviewed in this analysis, there has been little research that has compared the tuition and aid sensitivities of community college students with those in 4-year colleges. Some studies, however, have attempted to address this issue.

Manski and Wise (1983), in their analysis of NLS72, found that students at 4-year colleges and community colleges had similar levels of tuition sensitivity. Students at community colleges had a much greater sensitivity to financial aid, however. It is because of this greater sensitivity that they concluded that much of the effect of the BEOG program was to induce enrollments at community colleges, with virtually no enrollment effect at 4-year colleges.

In their review of student demand studies, Leslie and Brinkman (1987 and 1988) examined a handful of studies that analyzed enrollments separately at public 4-year and community colleges. While they estimated the overall student price response coefficient (SPRC) to be -0.7, they estimated the 4-year public SPRC to be -0.6 to -0.7, and the community college SPRC to be -0.9. They concluded that community college students were more responsive to tuition than students at 4-year colleges.

As described in chapter 2, Shires (1995) calculated tuition elasticities of demand for California community colleges, California State University, and University of California. He calculated elasticities of -0.15, -0.20, and -0.05, respectively, finding that community college students were more price responsive than students at the University of California, but slightly less responsive than students at California State University.

Kane's (1995) analysis of aggregate public enrollments by state looked at the effect on enrollments of increases in tuition at community colleges and 4-year colleges. He modeled the effect of a $1,000 tuition increase in each sector. His results are summarized in Table 9.

When tuition is increased $1,000 at community colleges, all public enrollments drop 3.5 percentage points, with enrollments at community colleges dropping 4.7 points. Public 4-year enrollments actually increase, as tuition there becomes more cost competitive with community colleges. When tuition is increased $1,000 at the 4-year colleges, total enrollments drop only 1.4 percentage points, with 4-year enrollments dropping 1.2 points. It appears from these findings that community college students are more likely to drop out of college entirely when their tuition is increased, compared with students at 4-year colleges.

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[29] See McPherson and Schapiro (1994) and Frances and Morning (1993) for data on the income distribution of students by sector.

[30] See National Center for Education Statistics (various years).

**Table 9: The Effect of Tuition Increases on Enrollments in Public 4-Year and Community Colleges, 1980 to 1992**

| | Percentage Point Change in Enrollment At | | |
|---|---|---|---|
| $1,000 Tuition Increase At | All Public Colleges | Public 4-Year | Community Colleges |
| Community Colleges | -3.5* | 1.8* | -4.7* |
| 4-Year | -1.4* | -1.2* | 0.5 |

Note: * = significant at a level ≤.05.
Source: Kane (1995, Table 2).

While not as extensive as some of the other questions addressed in this paper, the literature on tuition and aid sensitivity by sector does show that community college students are more sensitive to price than are students in 4-year institutions. This is likely because of the over-representation of both lower-income and minority students in community colleges.

## 5. Conclusions

The studies reviewed in this paper used a wide variety of methodological approaches and datasets to address a fundamental question: How sensitive are students to increases in college costs? Whether examining tuition, financial aid, or the net cost of attendance, the evidence is very consistent, and can be summarized in one sentence:

*As the price of college goes up, the*
*probability of enrollment tends to go down.*

The magnitude of this effect varies, depending upon the population being examined, which component of cost you change, and which statistical technique you use. It is also important to note that this is an aggregate effect, and may differ for individual institutions or groups of students. But as a whole, this fundamental relationship — the existence of a downward-sloping demand curve for higher education — has been confirmed.

The specific findings of this review include these key observations:

*Tuition Sensitivity* — Increases in tuition lead to declines in enrollment. The consensus among the studies reviewed is that every $100 increase in tuition results in a drop in enrollments of 0.5 to 1.0 percentage points across all types of institutions. It should be noted that this range is based on data from the 1970s and early 1980s, so that under today's higher tuition levels, the effect may be greater.

*Aid Sensitivity* — Decreases in financial aid also lead to declines in enrollment, with the effect differing depending upon what the type of aid awarded. In general, enrollments are more sensitive to grant awards than to loans or work study.

*Differences among income groups* — Lower-income students are more sensitive to changes in tuition and aid than are students from middle- and upper-income families.

| | |
|---|---|
| *Differences among races* | Black students are more sensitive to changes in tuition and aid than are white students. For Hispanic students, the evidence is more mixed. |
| *Differences between sectors* | Students in community colleges are more sensitive to tuition and aid changes than are students in 4-year public colleges and universities. |

As noted above, an important issue to be considered when formulating policy is that the majority of these studies analyzed data from the mid-1980s or earlier. Most used the National Longitudinal Survey of 1972 and the High School and Beyond Survey of 1980. All of these samples were from an era when college tuition, especially at public institutions, was far lower than it is today. If the demand for higher education is curvilinear rather than rectilinear, with higher sensitivity to increases at higher tuition levels, than the student price response coefficients found in the studies reviewed here will be lower than those in effect today. Students today would be more sensitive to tuition increases or aid cuts than the students who attended college 15 to 25 years ago.

The issues addressed in this paper deserve further study using enrollment, tuition, and financial aid data from more recent cohorts of college students. Such studies can help to answer the question posed in the introduction — whether recent tuition increases and financial aid cuts have served to restrict access to postsecondary education, especially for those students who have traditionally been underrepresented in colleges and universities. Or more accurately stated, How *greatly* have these changes helped to restrict access? Only by knowing the answers to these questions can policy makers begin to formulate strategies to assure access to public higher education.

## Appendix A

### Tuition and Fees at Public Colleges and Universities, 1989-1990 and 1993-1994 (in Constant Dollars)

| Institution/Group | 1989-1990 Tuition and Fees | 1993-1994 Tuition and Fees (in 1989 dollars) | 4-year Change | Annual Change |
|---|---|---|---|---|
| University of California | $1,673 | $3,449 | 106% | 20% |
| University of Massachusetts | $2,629 | $4,453 | 69% | 14% |
| *All Flagship Universities* | *$1,968* | *$2,465* | *25%* | *6%* |
| New York State Colleges | $1,482 | $2,543 | 72% | 15% |
| Texas State Colleges | $973 | $1,353 | 39% | 9% |
| *All Comprehensives* | *$1,599* | *$1,979* | *24%* | *5%* |
| Virginia Community Colleges | $798 | $1,147 | 44% | 10% |
| North Carolina Community Colleges | $270 | $484 | 79% | 16% |
| *All Community Colleges* | *$885* | *$1,070* | *21%* | *5%* |
| Median Income for 4-Person Families | $40,763 | $39,230 | -4% | -1% |

Source: Washington State Higher Education Coordinating Board (1994), National Center for Education Statistics (1994), and U.S. Bureau of the Census (1995). Tuition and fees (excluding room and board) are for in-state students. The "all" groups include a sample of each type of institution in each state. See Washington State Higher Education Coordinating Board (1994) for more information.

## Appendix B

### Summary of the Relationship Between Tuition and Enrollment

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| Leslie & Brinkman (1988) | Meta-analysis | $100 tuition increase, 1983 | SPRC for first-time freshmen of -0.7 percentage points |
| Jackson & Weathersby (1975) | Meta-analysis | $100 tuition increase, 1974 | SPRC of -0.05 to -1.46 points |
| McPherson (1978) | Meta-analysis | $100 tuition increase, 1974 | SPRC of -0.05 to -1.53 points |
| Kane (1991) | NLSY | $1,000 tuition increase, 1988 | SPRC of -13 to -15 points |
| Kane (1994) | HSB | $100 tuition increase, 1980 | SPRC of -0.63 to -1.22 points |
| Kane (1995) | IPEDS 1980 - 1992 | $1,000 tuition increase at community colleges, 1991 | SPRC of -3.5 points for total public enrollment |
| | IPEDS 1980 - 1992 | $1,000 tuition increase at 4-year colleges, 1991 | SPRC of -1.4 points for total public enrollment |
| Manski & Wise (1983) | NLS72 | Schooling costs divided by family income, 1972 | Similar SPRCs at community colleges and 4-year colleges |
| St. John (1990) | HSB | $1,000 tuition increase, 1982 | SPRC of -2.8 points |
| Savoca (1990) | NLS72 | $100 tuition increase, 1972 | SPRC of -0.49 points |
| McPherson & Schapiro (1991b) | CPS 1979 - 1989 | $100 tuition increase, 1979 | SPRC of -0.68 points for lower income students |
| Shires (1995) | California enrollments | | Price elasticity of demand of -0.15 at CCC, -0.20 at CSU, and -0.05 at UC |
| Heller (1994) | IPEDS 1984 and 1991 | $100 tuition increase, 1991 | SPRC of -0.35 for whites and -0.46 for blacks |

See chapter 2 for more information on each study.

## Appendix C

### Summary of the Relationship Between Financial Aid and Enrollment

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| Leslie & Brinkman (1988) | Meta-analysis | | 20% to 40% of lower-income and 13% of middle-income enrollments result of BEOGs |
| Jackson (1978) | NLS72 | $100 aid increase, 1972 | SPRC of 0.76 points; existence of any aid more powerful than the size of aid award |
| Blakemore & Low (1983) | NLS72 | Probability of receiving aid [P(aid)] | For white male, as P(aid) increases from 0% to 50%, P(enrollment) increases from 17% to 91% |
| Blakemore & Low (1985) | NLS72 | 30% cut in aid budgets, 1972 | Enrollment decrease of 4.7 to 8.5 points |
| | NLS72 | 15% cut in aid budgets and 15% tuition increase, 1972 | Enrollment decrease of 7.7 to 15.1 points |
| | NLS72 | 30% cut in aid budgets and 15% tuition increase, 1972 | Enrollment decrease of 10.2 to 16.2 points |
| Hansen (1983) | CPS 1971 and 1978 | | Enrollment rate of poorer students relative to richer no greater in 1978 than in 1971 |
| Kane (1994) | CPS 1970 to 1972 & 1973 to 1977 | | Enrollment rate of poorer students relative to richer no greater in 1973 - 1977 than in 1970 - 1972 |
| Manski & Wise | NLS72 | | BEOGs increased enrollments of lower-income students by 59%, middle income by 12%, and upper-income by 3% |
| McPherson & Schapiro (1991b) | CPS 1974 to 1984 | $100 aid increase, 1978 | SPRC of 0.70 points for lower-income students |
| Moore, Studenmund, & Slobko (1991) | Occidental College, 1989 | $1,000 increase in grants, 1989 | SPRC of 7.8 points |

**Appendix C (continued)**

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| Moore, Studenmund, & Slobko (1991) | Occidental College, 1989 | $1,000 increase in loans or work study, 1989 | No effect |
| Schwartz (1985) | HSB | | Grants had effect three times that of tuition; no effect from value of loan subsidy |
| St. John (1990) | HSB | $1,000 increase in grants, 1982 | SPRC of 4.3 points |
| | HSB | $1,000 increase in loans, 1982 | SPRC of 3.8 points |
| | HSB | $1,000 increase in work study, 1982 | SPRC of 4.6 points |
| Jackson (1988) | NLS72 | | Financial aid recipients were 6.5 percentage points more likely to enroll than non-recipients |
| Jackson (1988) | HSB | | Financial aid recipients were 7.8 percentage points more likely to enroll than non-recipients |
| St. John & Noell (1989) | NLS72 | | Probability of enrollment increased for recipients of:<br>Grants – 6.2 points<br>Loans – 10.8 points<br>Work study – 14.9 points<br>Combination – 14.7 points |
| St. John & Noell (1989) | HSB Seniors | | Probability of enrollment increased for recipients of:<br>Grants – 10.1 points<br>Loans – 9.5 points<br>Work study – 11.0 points<br>Combination – 8.2 points |
| St. John & Noell (1989) | HSB Sophomores | | Probability of enrollment increased for recipients of:<br>Grants – 6.2 points<br>Loans – 7.8 points<br>Work study – 9.7 points<br>Combination – 9.5 points |

See chapter 3 for more information on each study.

## Appendix D

### Summary of Income, Race, and Sector Effects

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| Corazzini, Dugan, & Grabowski (1972) | Project Talent & Boston Survey | | Lower-income students less likely to enroll |
| Jackson & Weathersby (1975) | Meta-analysis | | Lower-income students more sensitive to tuition increases |
| Manski & Wise (1983) | NLS72 | | Percentage of enrollments induced for BEOG recipients:<br>Lower-income – 41%<br>Middle-income – 17%<br>Upper-income – 5%<br>All students – 25% |
| Blakemore & Low (1985) | NLS72 | Tuition increases and aid cuts | Lower-income enrollments drop 3.5% to 24.3%; upper-income enrollments drop 1.1% to 8.3% |
| Schwartz (1986) | HSB | $100 tuition decrease, 1980 | No effect on lower-income students; middle- and upper-income SPRC of 0.1 points |
| Schwartz (1986) | HSB | $100 grant increase, 1980 | Lower- and middle-income SPRC of 0.2 points; no effect on upper-income students |
| Leslie & Brinkman (1987) | Meta-analysis | | Tuition sensitivity lessens as income increases |
| McPherson & Schapiro (1989) | CPS 1974 to 1984 | $100 tuition increase, 1978 | SPRC of -0.68 points for lower-income whites; *increase* in enrollments for middle- and upper-income students |
| McPherson & Schapiro (1989) | CPS 1974 to 1984 | $100 aid decrease, 1978 | No effect on white students of any income level |
| St. John (1990) | HSB | $100 tuition decrease, 1982 | SPRCs by income quartile:<br>Bottom – 0.34 points<br>2nd – 0.39 points<br>3rd – 0.31 points<br>Top – 0.14 points |

**Appendix D (continued)**

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| St. John (1990) | HSB | $100 grant increase, 1982 | SPRCs by income quartile:<br>Bottom – 0.88 points<br>2nd – 0.35 points<br>3rd – 0.33 points<br>Top – Not significant |
| St. John (1990) | HSB | $100 loan increase, 1982 | SPRCs by income quartile:<br>Bottom – Not significant<br>2nd – 0.53 points<br>3rd – 0.63 points<br>Top – Not significant |
| McPherson & Schapiro (1994) | American Freshman Survey | | Lower-income students more clustered in community colleges due to tuition increases and aid cuts |
| Behrman, Kletzer, McPherson, & Schapiro (1992) | NLS72 | Tuition increase at in-state 4-year publics | Hispanic and black enrollments in community colleges *increase*, but no effect on enrollments in 4-year colleges. No effect on white enrollments in community colleges, but enrollments in 4-year colleges *increase* |
| St. John & Noell (1989) | HSB Seniors | Effect of receipt of grant | Probability of enrollment increased for:<br>Whites – 8.9 points<br>Blacks – 17.7 points<br>Hispanics – 14.1 points |
| St. John & Noell (1989) | HSB Seniors | Effect of receipt of loan | Probability of enrollment increased for:<br>Whites – 8.8 points<br>Blacks – 14.5 points<br>Hispanics – Not significant |
| St. John & Noell (1989) | HSB Seniors | Effect of receipt of combination, including work study | Probability of enrollment increased for:<br>Whites – 7.1 points<br>Blacks – Not significant<br>Hispanics – Not significant |

**Appendix D (continued)**

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| St. John & Noell (1989) | HSB Sophomores | Effect of receipt of grant | Probability of enrollment increased for: Whites – 4.2 points Blacks – 15.0 points Hispanics – 3.8 points |
| St. John & Noell (1989) | HSB Sophomores | Effect of receipt of loan | Probability of enrollment increased for: Whites – 7.2 points Blacks – 11.2 points Hispanics – 13.1 |
| St. John & Noell (1989) | HSB Sophomores | Effect of receipt of combination, including work study | Probability of enrollment increased for: Whites – 8.1 points Blacks – 18.6 points Hispanics – Not significant |
| Jackson (1989) | HSB Seniors | Effect of receipt of grant | Probability of enrollment increased for: Whites – 6.3 points Blacks – 11.2 points Hispanics – Not significant |
| Kane (1991) | CPS 1970 to 1988 | Effect of changes in tuition, Pells, and net cost | Blacks more responsive than whites, with gap the largest for tuition sensitivity |
| Heller (1994) | IPEDS 1984 and 1991 | $100 tuition increase, 1991 | SPRC range of -0.35 to -0.58 points for whites and -0.46 to -0.63 points for blacks |
| Manski & Wise (1983) | NLS72 | | Students at community colleges more sensitive to financial aid than those at 4-year colleges; similar tuition sensitivities at both |
| Leslie & Brinkman (1988) | Meta-analysis | $100 tuition increase, 1983 | 4-year SPRC of -0.6 to -0.7 points; community college SPRC of -0.9 points |
| Shires (1995) | California enrollments | | Price elasticity of demand of -0.15 at CCC, -0.20 at CSU, and -0.05 at UC |

**Appendix D (continued)**

| Authors | Dataset | Question Variable | Key Findings |
|---|---|---|---|
| Kane (1995) | IPEDS<br>1980 - 1992 | $1,000 tuition increase at community colleges, 1991 | SPRCs:<br>All publics – -3.5 points<br>Comm. Colleges – -4.7 points<br>4-year publics – 1.8 points |
| | IPEDS<br>1980 - 1992 | $1,000 tuition increase at 4-year colleges, 1991 | SPRCs:<br>All publics – -1.4 points<br>Comm. Colleges – Not signif.<br>4-year publics – -1.2 points |

See chapter 4 for more information on each study.

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